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APPENDIX A. SCAQS PARTICIPANT AND MAILING LISTS

Many sponsors, participants, and potential users of the SCAQS data have contributed their ideas and their time for review and comment during the planning process. This Appendix includes lists of members of the SCAQS Management Advisory Group, of the SCAQS Technical Advisory Group, of the Emissions, Meteorology, and Model Working Groups, and of the CRC-APRAC SCAQS Coordination Group. Also included is a list of SCAQS projects and project managers and a current SCAQS mailing list.

Table A-1. Southern California Air Quality Study Management Advisory Group

<u>Organization</u>	<u>Representative</u>
California Air Resources Board	John Holmes
ARB Research Screening Committee and Scientific Advisory Committee	Jan Bush
South Coast Air Quality Management District	Katherine Wilson
Environmental Protection Agency	Art Davidson
Coordinating Research Council	Ken Knapp
Electric Power Research Institute	Tim Belian
Ford Motor Company	Peter Mueller
General Motors Research Laboratories	Tai Chang
Motor Vehicle Manufacturer's Association	George Wolff
Southern California Edison	Marcel Halberstadt
Western Oil & Gas Association	Carol Ellis
	Art Pope

Table A-2. Emissions Working Group

<u>Members</u>	<u>Organization</u>
Vince Mirabella	SCE Chairman
Paul Allen	ARB
Tim Belian	CRC
Rich Bradley	ARB
Glen Cass	Caltech
Anton Chaplin	Unocal (WOGA)
Art Davidson	SCAQMD
Paul Davis	Chevron (WOGA)
Marty Ferman	GM Research Laboratories
John Grisinger	SCAQMD
Marcel Halberstadt	MVMA
Steve Heisler	ERT
Kent Hoekman	Chevron
Ken Knapp	EPA
Ron Lantzy	Exxon
Peter Mueller	EPRI
Mike Nazemi	SCAQMD
Bill Oliver	Radian
Jack Paskind	ARB
Bill Pierson	DRI (formerly Ford)
Art Pope	Arco (WOGA)
Andy Ranzieri	ARB
Paul Roberts	STI (formerly Chevron)
Christian Seigneur	Bechtel
John Watson	DRI
George Wolff	GM Research Laboratories
Wayne Zwiacher	SCAQMD

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Chuck Bennett	ARB
Don Blumenthal	STI
Joe Cassmassi	SCAQMD
Frank DiGenova	ARB
Eric Fujita	ARB
Jack Horrocks	ARB
Bob Kessler	SAI
Bill Knuth	T&B Systems
Doug Lawson	ARB
Don Lehrman	T&B Systems
Frank Ludwig	SRI International
Stan Marsh	SCE
Ken Schere	EPA
Fred Shair	Caltech
Ted Smith	Ted B. Smith and Associates
Jack Suder	ARB
Mel Zeldin	SCE

Table A-4. Model Working Group

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Praveen Amar	ARB
Roger Atkinson	UC Riverside
Glen Cass	Caltech
Tai Chang	Ford
Anton Chaplin	Unocal (WOGA)
Alan Dunker	GM Research Laboratories
Michael Fosberg	US Forest Service
Robert Kessler	SAI
Chung Liu	SCAQMD
Alan Lloyd	ERT
Fred Lurmann	ERT
Vince Mirabella	SCE
Andrew Ranzieri	ARB
Philip Roth	WOGA
Kenneth Schere	EPA
Christian Seigneur	Bechtel
Christine Sloane	GM Research Laboratories
Thomas Tesche	Radian
Gary Whitten	SAI

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Glen Cass	Caltech
Sheldon Friedlander	UCLA
Daniel Grosjean	DGA
George Hidy	DRI
Warren Johnson	SRI
Peter McMurry	University of Minnesota
Ted Smith	Ted B. Smith and Associates

Table A-6. CRC-APRAC SCAQS Coordination Group

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Dr. Lowell Ashbaugh State of California Air Resources Board	Dr. S. Kent Hoekman Chevron Research Company
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Dr. Tai L. Chan General Motors Research Laboratories	Dr. Nelson A. Kelly General Motors Research Laboratories
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Mr. Martin A. Ferman General Motors Research Laboratories	Dr. Christine S. Sloane General Motors Research Laboratories
Mr. Eric Fujita State of California Air Resources Board	Dr. Eric E. Wigg Exxon Research & Engineering Company
Dr. Robert A. Gorse, Jr. Ford Motor Company	

Table A-7. SCAQS PROJECTS AND PROJECT MANAGERS

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AeroVironment	SCAQS sampler design, construction; B-site oper.	Mike Chan	(818) 357-9983
AIHL	Acid deposition studies	Bruce Appel	(415) 540-2477
AIHL	Berner impactor & chemistry	Walter John	(415) 540-2644
ARB	Acid sampling methods comparison	Lowell Ashbaugh	(916) 445-0753
ARB-EI Monte	Long Beach B-site, acid sampling	John Kowalski	(818) 575-6856
Biospherics	Canisters for HC analysis, QA; toxics	Rei Rasmussen	(503) 690-1077
Caltech	Fog/smog/fog studies	Michael Hoffmann	(818) 356-4391
Caltech	Model Working Group	John Seinfeld	(818) 356-4635
Caltech	Tracer studies	Fred Shair	(818) 356-6811
Carnegie-Mellon U	Dry deposition measurements	Cliff Davidson	(412) 268-2951
Daniel Grosjean & Asso.	Organic acids, PAN	Daniel Grosjean	(805) 644-0125
DRI	Acid sampling	John Bowen	(702) 972-1676
DRI	Long range transport from LA	David Rogers	(702) 972-1676
DRI	Aerosol water content	Fred Rogers	(702) 972-1676
DRI/STI	Analysis Coordinator	John Watson	(702) 972-1676
EMSI	SCAQS sampler analysis, B-site data vol	Bill Keifer	(805) 388-5700
EMSI-BNL	H2O2 @ B-sites	Miriam Lev-On	(805) 388-5700
EPA/Northrop	Acids and organic toxics	Bill Lonneman/Ellenson	(919) 541-2829
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EPA/LV	LIDAR aircraft	Jim McElroy	(702) 798-2260
ERT	Aerosol carbon, carbonyls, acid species, PAN	Kochy Fung	(805) 499-1922
ERT	Quality Assurance Manager, Data Manager	John Collins	(805) 499-1922
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Global Geochem	Alcohols, carbon 14	Bob Gordon	(818) 992-4103
GM Research Labs	A/B van, special PM-10, captive air studies, etc	George Wolff	(313) 986-1599
Illinois Inst of Tech	Coarse particle measurements	Ken Noll	(312) 567-3538
LBL	Aerosol absorption	Tony Hansen	(415) 486-5319
OGC	Continuous aerosol carbon	James Huntzicker	(503) 690-1072
Radian	Day-specific emissions	Bill Oliver	(916) 362-5332
S W Research	Motor vehicle emissions study	Mel Ingalls	(512) 522-2645
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STI	Program Coordinator, aerosol instruments, etc	Don Blumenthal	(707) 527-9372
STI	Field Manager	Susanne Hering	(213) 206-6193
STI	Spiral aircraft	Jerry Anderson	(707) 527-9372
STI	Long path light extinction by radiance difference	WILL Richards	(707) 527-9372
T & B Systems	Upper air soundings	Don Lehrman	(707) 526-2775
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UC Davis	Drum impactors for elements, babs by LIPM	Tom Cahill	(916) 752-1120
UC Riverside	HONO and NO3 by DOAS	Arthur Winer	(714) 787-4651
UCLA	Impactor SO4, NO3, FTIR	David Allen	(213) 206-0300
UCLA	Impactor Pb, dichots	Sheldon Friedlander	(213) 825-2206
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Univ. of Illinois	Temperature/RH nephelometer	Mark Rood	(217) 333-6963
Univ. of Minnesota	MOUDI impactor for carbon, aerosol water	Peter McMurry	(612) 625-3345
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APPENDIX B
SUMMARY OF AIR QUALITY STUDIES

Summary of Selected Past South Coast Air Basin Studies

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: Miller et al. (1972), Topic: Aerosol To apply the chemical mass balance model to estimate source contributions to atmospheric aerosol	Pasadena, CA Sept. 1969	11-hr TSP mass Ions (NH_4^+ , $\text{SO}_4^{=}$, NO_3^-)	Tracer solution to the chemical mass balance	Tracer species can be used to estimate source contributions to ambient elemental concentrations
Reference: Friedlander (1973), Topic: Aerosol To state the fundamental principles of the chemical mass balance model To apply a carbon balance to estimate secondary conversion of organic vapors	Pasadena, CA Sept. 1969	11-hr TSP mass Carbon and carbon components Elements Source Sampling for soil	Least squares solution to the chemical mass balance	<p>Major source contributions in Pasadena:</p> <ul style="list-style-type: none"> Carbon (17%) Soil (9.8%) Automobile (8.2%) Sea Salt (2.5%) Fuel-Oil Combustion (0.25%) <p>57% of TSP mass was unexplained</p> <p>Secondary aerosol (40%) was the major contributor. Other significant contributions were 25% from primary manmade and 15% from primary natural sources</p> <p>Particle size distribution is important since the chemical composition is an average over the size spectrum</p> <p>Limitations of CMB involve chemical/physical processes, particle fractionation and variability in time and space</p>

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
<p>Reference: Hidy et al. (1975), Topics: Aerosol, Visibility</p> <p>To characterize the chemical & physical properties of urban and non-urban aerosols</p> <p>To attribute ambient concentrations to primary & secondary pollutant sources</p> <p>To identify major causes of production & visibility reduction</p> <p>To estimate the extent of ambient air quality standards that can be achieved by existing technologies</p> <p>To evaluate the applicability of aerosol instrumentation in the study for use in monitoring networks</p> <p>To elucidate the photochemistry of aerosol formation</p>	<p>12 sites for mobile labs-Berkeley, Richmond-SFOAF, Fresno, Hunter-Liggett Military Reservation, Freeway Loop, Pomona, Goldstone, Pt. Arguello, W. Covina, Robidoux (Riverside), and Domine Hills</p> <p>July to Nov. 1972 July to Oct. 1973</p> <p>Light scattering Liquid water content Particulate fallout mass and organics</p> <p>Gases (SO_2, H_2S, NO, NO_2, NH_3, Total HC, HC, CH_4, C_2H_4, C_2H_2, CO and O_3) Meteorology (WS, WD, T°, RH, radiation and rainfall)</p>	<p>Aerosols Aerosol size distribution Size and chemically classified particles</p> <p>Aerosol size distribution Size and chemically classified particles</p> <p>Light scattering Liquid water content Particulate fallout mass and organics</p> <p>Gases (SO_2, H_2S, NO, NO_2, NH_3, Total HC, HC, CH_4, C_2H_4, C_2H_2, CO and O_3) Meteorology (WS, WD, T°, RH, radiation and rainfall)</p>	<p>Descriptive graphical & statistical methods</p> <p>Several models applied to data by other researchers</p> <p>Discovered that the two mass modes have independent sources and interact minimally in the atmosphere</p> <p>Found that particles formed by chemical reactions in the atmosphere add to the small particle size mode</p> <p>Pioneered the application of receptor models</p>	<p>Found simplified approaches for the study of atmospheric particles</p> <p>Showed urban and rural aerosol mass is probably distributed bimodally in small ($\text{dp} < 3 \mu\text{m}$) and large ($3 \mu\text{m} < \text{dp} < 20 \mu\text{m}$) plus giant ($\text{dp} < 20 \mu\text{m}$) particles</p>

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: White et al. (1978), Topic: Sulfate To examine the relationships between daily power plant SO ₂ emissions and ambient sulfate concentrations in Los Angeles Basin	Azusa, Downtown LA, LAX, Long Beach Airport W. Covina May - Oct., 1975	Ions (24-hr SO ₄ ²⁻) Gaseous (1-hr O ₃) Meteorological parameters (RH, T850, TLA) Daily SO ₂ emissions from power plants	Linear roll-back model	Lack of correlation between power plant SO ₂ emissions and ambient SO ₂ levels was found Power plant emissions on an average day account for 17% of the average sulfate concentrations at W. Covina (a high sulfate site) Factors other than sulfur emissions affect sulfate production in SOCAB

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: Henry and Hidy (1979), Topic: Sulfate	<p>To empirically identify the underlying chemical and physical process for sulfate production</p> <p>To apply a principal components model which is unaffected by intercorrelations of the variables</p> <p>Jan. 1974 to Jan. 1975</p>	<p>Southern California sites: Anaheim, Garden Grove, Glendora, Santa Monica, Thousand Oaks, Vista, W. Covina, CA</p> <p>Meteorological variables (RH, temp, WS, WD, inversion, ventilation)</p>	<p>24-hr TSP mass</p> <p>Gases (SO₂, NO_x, O₃, NMHC, total HC)</p>	<p>Regression on principal components</p> <p>Photochemical processes, SO₂ sources and atmospheric dispersion and transport are the three major causes of southern California sulfate levels</p> <p>Photochemical activity variance of (17-32%) and atmospheric moisture content variance of (9-15%) account for more than half of the sulfate variability</p>

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: Tombach (1982), Topic: Hydrocarbon Sources <u>Receptor Model</u>	(I) To apply the chemical mass balance model to volatile organic compounds (VOC) To determine the major contributions of ambient VOC levels in the South Coast Air Basin	3 times/day ambient samples Nonmethane hydrocarbon compounds Source samples included: auto exhaust gasoline, gasoline vapor, natural gas, liquefied petroleum gases	Ordinary weighted least squares chemical mass balance	Receptor modeling can be used for VOC source attribution studies with good understanding of experimental method and chemical process
<u>Tracer Release</u>	(II) To quantify the total VOC emissions from various operations in a refinery	Tracer release of SF ₆ gas 16 Sites at downtown and upwind	<u>Dispersion Model</u> (AUQUAL, Lissaman, 1973; Huang & Head 1978)	Relative changes in concentration between inert and reactive VOC species from the same source-type can identify sources The VOC source contributions varied with time of day Auto exhaust (53%), natural gas (19%), gasoline (12%) and gasoline vapor (10%) were the major contributors of hydrocarbons to receptors
				Process areas and emulsion plant (58%) and floating roof storage tanks (38%) were the major contributing operations in the refinery to the ambient NMHC levels

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: Cass and McRae (1983), Topic: Aerosol				
To develop better source apportionment techniques To assess the effects of different model structures on estimated source contributions	5 SCAQMD sites: Azusa, Lynwood, Pasadena, Reseda, W. Los Angeles 5 NASN sites: Anaheim, Lennox, Los Angeles, Pasadena, San Bernardino 1976 to 1977	24-hr TSP mass Ions ($\text{SO}_4^{=}$, NO_3^- , NH_4^+) Elements	Emission Inventory/Rollback Tracer solution to chemical mass balance receptor model Ordinary weighted least squares solution to the chemical mass balance receptor model Multiple linear regression	Emissions inventory for fine particle trace metals can be constructed by superimposing size and chemical source compositions (resulted from source test) onto conventional TSP inventory Identifying key tracer elements of emission sources is important and can be used as input to CMB Model, thereby compensating for the deficiency in HIYOL data Consistent results were yielded by model/model comparisons

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Location/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>
Reference: Spicer et al. (1983), Topic: Photochemical Measurements To determine the spatial and temporal distribution of oxidized nitrogen species in the Los Angeles Air Basin To determine the extent to which measured NO_x products can account for NO_x removal from the air (i.e., nitrogen mass balance) To investigate differences in the transformation processes for NO_x relative to SO_x To estimate the rate of NO_x transformation under photochemically reactive conditions To investigate the transport of O_3 and precursors from urban areas	Los Angeles Air Basin 3-ground sampling sites: Rubidoux, Upland, Temple City Oct. to Nov., 1976 42 aircraft flights over 22 days Temperature	(0900 to 1700 PST) Ions (NO_3^- , $\text{SO}_4^{=}$, NH_4^+) Gases (SO_2 , O_3 , NO , NO_2 , PAN, total nitrogen, NHC, CO, CH_4 , C_2H_2 , C_2H_4 , Freon-11)	Graphical and statistical descriptions	Average daytime distribution of NO_x at 3 sites was: Temple City Upland Rubidoux NO 19% 10% -- NO ₂ 78% 66% 78% PAN 3% 22% 10% HONO ₂ -- -- -- NO_3^- 1% 1% 12% * 11 Photochemically active days

Summary of Selected Past South Coast Air Basin Studies (cont'd)

<u>Study Objectives</u>	<u>Sampling Site/Period</u>	<u>Observables</u>	<u>Model Used</u>	<u>Major Findings</u>	
Reference: Pratsinis et al. (1984), Topics: To estimate primary and secondary carbon contributions at receptors To calculate a visibility extinction budget for Los Angeles	Duarte and Lennox July, 1980 to May, 1981	Carbon Measurements, Visibility Reduction 8-hr Particulate Mass HI VOL with cascade impactor ($d_p < 15 \mu m$, $3.5 \mu m$, and $< d_p < 7.2 \mu m$, $d_p < 3.5 \mu m$) Dichotomous sampler ($3.5 \mu m < d_p < 15 \mu m$ and $d_p < 3.5 \mu m$) Elements (PIXE) Ions (NH_4^+ , $SO_4^{=}$, NO_3^- , Cl^-) Organic compound (volatile carbon black carbon)	Thermal analysis Emission inventory scaling Regression analysis	Lennox Automobile Industrial Sources Duarte Lennox Duarte 12% 26%	Major source contributions to the carbon containing component of the fine aerosol A high correlation ($R=0.72$) was found between ozone and secondary carbon, and low correlation ($R=0.65$) was found between sulfate and secondary carbon The carbon containing component was responsible for 27 and 44% of the incident light extinction at Lennox and Duarte, respectively